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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,939	11/20/2003	Martin Lowisch	081468-0306865	6805
909	7590	05/10/2005	EXAMINER	
PILLSBURY WINTHROP SHAW PITTMAN, LLP			MATHEWS, ALAN A	
P.O. BOX 10500			ART UNIT	
MCLEAN, VA 22102			PAPER NUMBER	
			2851	

DATE MAILED: 05/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/716,939	Applicant(s) LOWISCH ET AL.	
	Examiner Alan A. Mathews	Art Unit 2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/26/04 & 5/4/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claim 18 is objected to because of the following informalities: In claim 18, line 1, there is no proper antecedent basis for "said code means". Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

3. Claims 1 and 4 -21 are rejected under 35 U.S.C. 102(a) as being anticipated by the Published EUROPEAN PATENT APPLICATION 1 251 402 A1 (cited in Applicant's PTO-1449). Figure 1 discloses element PL projecting a pattern beam from mask MA onto a target portion of substrate (wafer) W. Paragraph # 2 and paragraph # 6 disclose using a reflective mask as an alternative to using a transmissive mask. Paragraph # 11 discloses imperfections in the patterning means (masked-induced imaging artifacts). Paragraph # 37 and paragraph # 39 and paragraph # 40 disclose that compensation can be used to reduce any lithographic effect that is detrimental to image quality. This is controlling system aberrations in the projection system used in said projecting to compensate for mask-induced imaging artifacts. Something would

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absorb radiation that is not part of the pattern. With respect to claim 4, paragraph # 19 and paragraph # 29 disclose pattern feature type, illumination mode (illumination settings), and numerical aperture. With respect to claims 5 and 10, paragraph #37 and paragraph # 39 and paragraph # 40 recite Zernike polynomials. With respect to claim 7, paragraph # 19 discloses “best focus position”. With respect to claims 11 and 13 of the instant application, claim 1 of the Published EUROPEAN PATENT APPLICATION 1 251 402 A1 discloses obtaining information on properties of the patterning means, obtaining a plurality of coefficients which quantify the relationship between said properties and at least one of a plurality of lithographic errors (aberrations) causing anomaly in a projected image in the radiation sensitive layer, defining a merit function which weighs and sums lithographic errors, calculating a compensation to apply to at least one of the substrate, the projection beam, the patterning means and the projection system to **optimize** the merit function, and applying the calculated compensation. This would be the same thing as determining the sensitivities of different features in a mask pattern to different aberrations and determining the optimum combination of aberrations using the determined sensitivities. With respect to claims 13, 20 and 21, since the apparatus is controlled by a computer, the computer must have a computer readable medium to instruct the apparatus to perform the recited steps. With respect to claims 12 and 4, paragraph # 15 discloses the use of simulation software (see line 47 and 52). Paragraph # 15 further discloses “For instance, given specific (critical) pattern features to be imaged, given specific pattern errors (such as phase errors with a phase shift mask), given the aberration of the projection system, given the data concerning the radiation sensitive layer on the substrate, and given the radiation beam properties such as

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radiation energy and wavelength (i.e. given a set of properties), predictions regarding CD uniformity or feature-specific deficiencies can be made with these **simulation programs**.

4. Claims 13- 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Bendik et al. (U. S. Patent No. 6,673,638). Figure 1 and column 4, lines 49-64, disclose a reticule having test structure features 102, 104, 106, 108, 110, and 122. Figure 4 and column 8, lines 22-35, illustrate which sensitivities varies according to the target configuration. Figure 9 discloses computer 952. Since the apparatus is controlled by a computer, the computer must have a computer readable medium to instruct the apparatus to perform the recited steps. Column 13, lines 55 –57, disclose the wafer or **reticule** inspection system may be used to detect defects. With respect to claim 14, figure 3 and column 7, lines 55-67, and column 8, lines 1-14, disclose simulating images. With respect to claim 16, column 11, line 50, discloses the “drift in focus”. An addition, 404 in figure 4 is the best focus.

Claim Rejections - 35 USC § 103

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Published EUROPEAN PATENT APPLICATION 1 251 402 A1 as applied to claim 1 above, and further in view of either Han et al. (U. S. Patent Application Publication No. 2004/0091789) or the article entitled “Asymmetric Properties of the Aerial Image in Extreme Ultraviolet Lithography” by Otaki (hereafter called the Otaki article). The Published EUROPEAN PATENT APPLICATION 1 251 402 A1 discloses the invention except for specifically stating

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that the radiation absorber is thick relative to a wavelength of the patterned beam of radiation.

Han et al. discloses in figures 5 and 6 and paragraphs # 39 - #54, absorber 32 on reflective mask

10. Paragraph # 40 discloses an example where the thickness t of the absorber 32 is 38

nanometers, and the wavelength λ is 13.4 nanometers, and thus the radiation absorber is thick

relative to a wavelength. The Otaki article discloses in figure 2 a mask absorber that is 50-

100nm, and the wavelength λ is 13.5 nm. On page 6823, under section "4", the Otaki article

further discloses relationships of the absorber thickness and the illumination angle. It would

have been obvious at the time the invention was made to a person having ordinary skill in the art

to the reflective masks in Han et al. with an absorber that is thick relative to the wavelength in

view of either Han et al. or the Otaki article for the purpose of better image control and thus

producing a better final product.

Conclusion

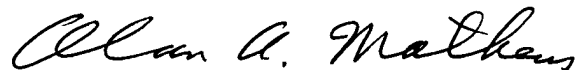
6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patents cited in the PTO-1449 are cited for the same reasons they were cited in Applicant's PTO-1449s. The patent to Baselmans et al. is cited to show the U.S. equivalent to EP 1 251 402 A1 used in the rejection. The patent to Van Der Werf is cited to show the U.S. equivalent to EP 1 271 4247 A1 cited in Applicant's PTO-1449. The patent to Yedur et al. is cited to show determining the sensitivities of different features of a mask 72 (see column 8, lines 55-57).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan A. Mathews whose telephone number is (571) 272-2123. The examiner can normally be reached on Monday through Friday from 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alan A. Mathews
Primary Examiner
Art Unit 2851

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